

WISCONSIN.

Temperature.—The mean was 1.0 below the normal; maximum, 98, at Osceola, 10th; minimum, 12, at Ashland and Menomonee, 28th.

Precipitation.—Greatest monthly, 8.86, at Manitowoc; least monthly, 1.09, at Viroqua.

Wind.—Prevailing direction southeast.—*W. L. Moore, Local Forecast Official, Weather Bureau, Milwaukee, director.*

VIRGINIA.

Temperature.—Maximum, 95, at Saluda, 9th; minimum, 32, at Hot Springs, 29th; greatest monthly range, 61, at Avon; least monthly range, 38, at Cape Henry and Norfolk.

Precipitation.—Greatest monthly, 9.43, at Irwin; least monthly, 2.38, at Big Stone Gap.

Wind.—Prevailing direction, southwest.—*Dr. E. A. Craighill, Lynchburg, director; J. N. Ryker, Observer, Weather Bureau, assistant.*

WASHINGTON.

Temperature.—The mean was 2.0 below the normal; maximum, 102, at Connel, 1st; minimum, 26, at Centerville, 22d.

Precipitation.—The average was 0.03 below the normal; greatest monthly, 6.04, at Tatoosh Island; least monthly, 0.32, at Fort Simcoe.

Wind.—Prevailing direction, southwest.—*H. F. Alciatore, Observer, Weather Bureau, Olympia, director.*

WYOMING.

Temperature.—The mean was slightly above the normal; maximum, 99, at Wheatland, 3d; minimum, 21, at Lander, 22d, and at Saratoga, 24th; greatest monthly range, 73, at Sheridan; least monthly range, 54, at Laramie.

Precipitation.—The average was below the normal; greatest monthly, 1.57, at Sheridan; least monthly, trace, at Wheatland.

Wind.—Prevailing directions, northwest and southwest.—*E. M. Ravenscraft, Observer, Weather Bureau, Cheyenne, director.*

OBSERVATIONS ON THE GREAT LAKES.

The Lake Marine Section of the Forecast Division has received monthly reports of the weather from captains of vessels navigating the Great Lakes as follows:

May, 1893, one report; June, 1893, two reports; July, 1893, sixteen reports; August, 1893, thirty-three reports; September, 1893, thirty reports.

The following notes are gleaned from the records of these marine observers:

July 15.—Capt. John Cochrane, of the s. s. "Marion," about 40 miles south of Pilot Island, Lake Michigan, reports the aurora borealis. Capt. C. H. Bassett, of the s. s. "Manola," east of Mackinaw City, reports the same aurora. Capt. W. W. Brown, of the s. s. "Choctaw," in the northern portion of Lake Huron, reports "northern lights nearly cover the whole sky." Capt. B. Nelson, of the s. s. "George T. Stope," on Lake Huron, reports a brilliant aurora between July 15, 10 p. m., and July 16, 3 a. m., standing from the northwest to south-southeast.

August 5, 6, 12, 13.—Brilliant auroras reported by many observers.

August 5.—Numerous meteors reported by several captains.

Capt. H. Zealand, of the s. s. "Selwyn Eddy," reports, August 18, 24, 27, respectively: "On each day four bottles were thrown overboard between Detour and Thunder Bay."

August 20.—Aurora reported by Capt. James Parsons, of the s. s. "Charles Hedard," in the eastern part of Lake Superior.

August 8, 9, 11.—Numerous meteors, and August 12, 18, brilliant auroras reported by Capt. H. Cronkhite, of the s. s. "Japan."

Capt. J. C. Ackerman, of the s. s. "City of Marquette," reports twenty bottles planted September 19-27, and a very bright aurora September 27.

Capt. Edward Mooney, of the s. s. "Wawatam," September 5, near the Saint Marys River, reports northern lights.

Capt. R. E. Gain, of the s. s. "W. H. Sawyer," September 8, midnight, bright northern lights; September 11, 6 p. m., the wind was from the north at the surface of the water, but from the south at the masthead; September 19, pale yellow sunset, indicating fresh northwest winds.

Capt. Frank D. Root, of the s. s. "Maritana," in the eastern portion of Lake Superior, September 8, reports a fine display of northern lights.

Capt. E. M. Smith, of the s. s. "Northern Queen," reports, September 5, in the Saint Marys River, brilliant aurora all night; September 27, western part of Lake Superior, very brilliant aurora.

Capt. W. H. Campan, of the s. s. "Northern King," on Lake Superior, September 5, 2 a. m. to 3.20 a. m., reports fine aurora; September 20, on Lake Superior, 1 a. m. to 3 a. m., aurora.

Capt. C. W. Lockwood, of the s. s. "B. L. Pennington," September 16, near Saint Marys River: Northwest squalls, with rain; wind as high as 50 miles per hour at short intervals; from 8 a. m. to 2 p. m. gale at its highest fury. 45 to 55 miles per hour; barometer rising fast; the first dangerous gale in these latitudes since April.

Capt. John Low, of the s. s. "Kaliyuga," complains that the wreck of the schooner "Pelican," 1½ miles north of the Ashtabula Lights, is a very dangerous object, and a similar wreck, the "David Vance," exists at Point Pelee; also another south-southeast of Bar Point Light, all of which should be blown up.

Capt. Thomas Hackett, of the s. s. "Volunteer," reports: September 16, at anchor at Fish Point, the heaviest gale of the season, velocity 50 miles from the southwest to the northwest; September 30, have had heavy northerly winds for three days, signals not put up at Sand Beach until 11 a. m. to-day;

September 4, 5 a. m., off Point Austin, heaviest thunder and lightning ever experienced, very heavy rain and the wind from the southeast; September 5, northern lights in the evening; September 17, northern lights last night; September 30, southeast and south-southeast gale blowing for over 30 hours, wind 50 miles an hour, barometer very high, and heavy sea from southeast. The longest steady southeast blow that he can remember.

Capt. D. Hourigan, of the s. s. "Hecla," September 7, off Big Sodus, on Lake Ontario: 2 a. m. to daylight heavy lightning and southeast winds; September 11, Lake Ontario, 1 a. m. to 3 a. m., very bright northern lights.

Capt. John M. Gee, of the s. s. "City of Racine," September 23, between Muskegon and Chicago: A remarkable strong current on the east shore of Lake Michigan, running to the southward.

The co-operating observers also forward the investigation of the currents in the Lake waters by depositing floating bottles with inclosed papers which, when found cast up on shore, are to be returned by mail.

A Current Chart of the Great Lakes was published in September, showing the results of the efforts made by the Weather Bureau in 1892 to obtain some idea of the currents of the Great Lakes. A large number of bottles inclosing printed forms were dropped overboard by navigators at many places in the open water on the Lakes. Of these 463 have been picked up and returned; the bottles were so weighted as to float just beneath the surface of the water. Although the surface-drift is rendered irregular by the variations of the winds, yet, in general, it may be stated that the eastward motion on Lake Superior toward the Saint Marys River is very decided; on Lake Michigan there is a strong southward surface movement on the western shore which gradually turns eastward and becomes northeast or north on the eastern shore of the Lake until finally it becomes a steady flow toward the Straits of Mackinaw; on Lake Huron the surface flow is toward the south, deviating eastward in the eastern portion with a decided set into the Georgian Bay, and also deviating westward with a decided set into Saginaw Bay, but in the extreme southern part of the lake the motion is steadily toward the River Saint Clair; on Lakes Erie and Ontario the wind drives the surface water, with but little variation, east-north-east toward the respective outlets. As these returns all relate to the season of navigation for 1892, and principally from April to October, the surface-floats here discussed must have described their courses within the space of a few months, and although some of them may have described irregular paths, of which we can have no knowledge, yet many of the bottles must have passed in comparatively direct lines. We may infer that deeper, gentle currents must have existed in directions opposed to those of the surface currents, and these under currents will doubtless be found to have an appreciable influence on the formation of the bottom of the Lakes.